

### ***Arborist Report: Tree Assessment***

**Date:** February 28<sup>th</sup>, 2020  
**To:** Scott Cannon  
**From:** Chris Rippey, Rippey Arboriculture LLC  
**Subject:** Sonic tomography and resistance drill assessment of a coast redwood tree in Seattle, Washington

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### ***Introduction***

This report is the summary of a tree assessment performed on February 28<sup>th</sup>, 2020 at 1041 NE 100<sup>th</sup> St. in Seattle, Washington. The scope of work was to:

- Assess the subject tree using a Rinntech ArboTom® sonic tomography imaging unit.
- Utilize an IML RESI 300® micro resistance drill to confirm sonic tomography results.
- Provide care recommendations.
- If the best course of action is to remove the tree, opine on why other mitigation options are not appropriate.

### ***Limitations & Assumptions***

This tree assessment was performed from the ground only. Tree defects or tree parts that were not located at ground level were only visually inspected. Sonic tomography and resistance drill assessments were performed on the lower trunk and at the point of main trunk attachments only. Only visible tree roots were inspected. No underground inspections were performed. The structural stability of the tree's root system was not inspected or quantified.

### ***Acknowledgements***

All trees will eventually fail. Tree failures are the result of a combination of factors. Predicting precisely when or how trees will fail is not possible. Unless fully removed, all trees pose some amount of risk to humans.

This tree assessment and care recommendations do not consider specific targets or the occupancy rates of specific targets which the assessed tree could damage. This recommendation does not consider the risk tolerances of the tree owner. Tree assessments including IML RESI® resistance drilling, ArboTom® sonic tomography, ArboStApp® calculations and the provided care recommendations are not meant to be relied upon as fact or promises of a result. This assessment and care recommendations should only be considered during the tree owner's decision-making process. The tree owner, and not Rippey Arboriculture

LLC is responsible and potentially liable for the assessed tree and damages that it may cause.

### ***Tree Assessment***

The subject tree is a coast redwood (*Sequoia sempervirens*) that resides in the backyard of the property at 1041 NE 100<sup>th</sup> St. in Seattle, Washington. The property on which the tree resides is in a single-family neighborhood. The tree is roughly 20 feet from a house on the property.

The subject tree is 97 feet tall and is 84 inches in diameter when measured at four and a half feet from grade. The tree has good foliage density, foliage color and relatively few dead branches throughout the tree's canopy.

The tree has two main trunks that diverge from the main trunk at about 6 feet high from grade. There is included bark on the east and west side where the trunks diverge. The west side of this attachment appears to have recently separated (Figure 1). There is also a large amount of reactive wood growth on the east side of the attachment (Figure 2). Both main trunks diverge at about 20 feet high where they form a total of five separate trunks.

Two sonic tomography tests were performed, one at 25 centimeters and one at 150 centimeters. These tests were performed to determine if there is any internal wood decay at the base of the subject tree's trunk and at the area where the two main trunks diverge. Both sonic tomography results indicate that there is internal decay with more extensive decay being found at the lower trunk test site.

The results of the lower test site (Figure 3) indicate a significant amount of decayed wood including a large hollow area in the center of the tested cross section of tree trunk. Non-decayed wood is indicated to be in the northeast, southeast and west quadrants. Based on the type of tree wood, shape of the cross section and the

location of decay, a 38% loss in load carrying capacity (strength) has occurred.

Results from the higher test site (Figure 4) indicates a significant amount of decayed wood. Most decay is incipient decay with some sporadic hollow spots and pockets of severely decayed wood. Significant amounts of non-decayed wood are indicated to be in the north, southeast and west quadrants. Based on the type of tree wood, shape of the cross section and the location of decay, a 21% loss in load carrying capacity (strength) has occurred.

A micro-resistance drill was then used at two places (Figure 5 & Figure 6) along the upper test area to confirm the presence of decayed wood and validate the sonic tomography reading. The first test was taken in between where Sensor 4 and 5 were placed drilling into the tree towards the west. These second test was taken in between where Sensors 7-8 were placed drilling into the tree towards the north. Both tests confirmed internal wood decay that is at the approximate depths of the decayed wood in the sonic tomography images.

#### ***Care Recommendations***

This tree has extensive internal wood decay that has caused a significant loss in strength. There is significant internal wood decay and strength loss where this tree diverges into two main trunks. There is included bark where these two main trunks attach as well as a section on the west facing trunk where the attachment is separating. There are large amounts of reaction wood on the east side of this attachment. This wood has been grown as a reaction to that strength loss due to decayed internal wood.

Two options were considered to mitigate the strength loss of this tree and the poorly attached main trunks. These were installing tree support systems and reduction pruning. Both were considered inappropriate for the following reasons.

Industry standard (ANSI A300) cable systems must be installed in the upper two-thirds of the tree's canopy. Installing either static or dynamic cables restricts the ability of the tree to move and naturally dissipate wind forces, thus transferring load to the lower parts of the tree. On this tree, load would be increased at the tree's decayed trunk attachment and lower stem. Because of this, a cable support system should only be installed in conjunction with a bolt system. This bolt would be

place through the tree at the main stem attachment to add strength to the area. Unfortunately, this is cable and bolt support system is not reasonable because the shell wall thickness at the trunk attachment is only two inches thick and it not strong enough to support a tree bolt system.

Pruning the tree is also not appropriate due to the extensive amount of canopy that would have to be removed to produce a relatively safe tree. According to Rinntech ArboStApp® modeling (Figure 5), the upper third of the tree would have to be removed to produce a tree that is estimated to support 1.5 times its expected load. Performing such severe pruning would not guarantee structural stability, would cause long-term health issues to the tree and will require expensive long-term maintenance costs.

Because no reasonable mitigation option was found, it is my recommendation that this tree be removed due to the tree's architecture, strength loss due to internal wood decay and trunk separation.

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*ASCA Tree and Plant Appraisal Qualified*  
*ISA Certified Arborist/ Municipal Specialist*  
*(WE-7672AUTM)*  
*ISA Tree Risk Assessor Qualified*

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***Photographic Evidence***



***Figure 1: Attachment separation with included bark on the west side of the trunk at six feet from grade.***

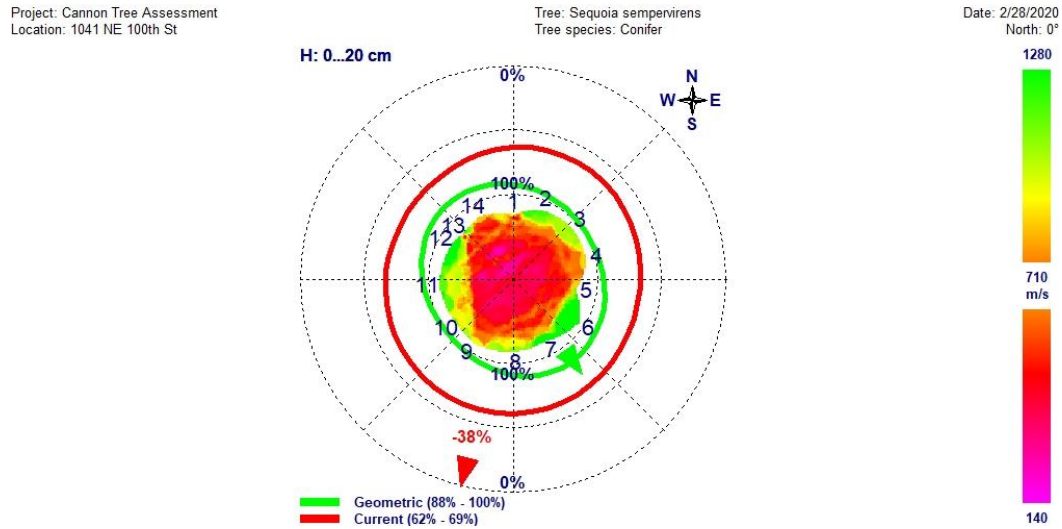
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*Figure 2: East side of the attachment with large area of reaction wood growth shown left of center.*

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## Sonic Tomography Results

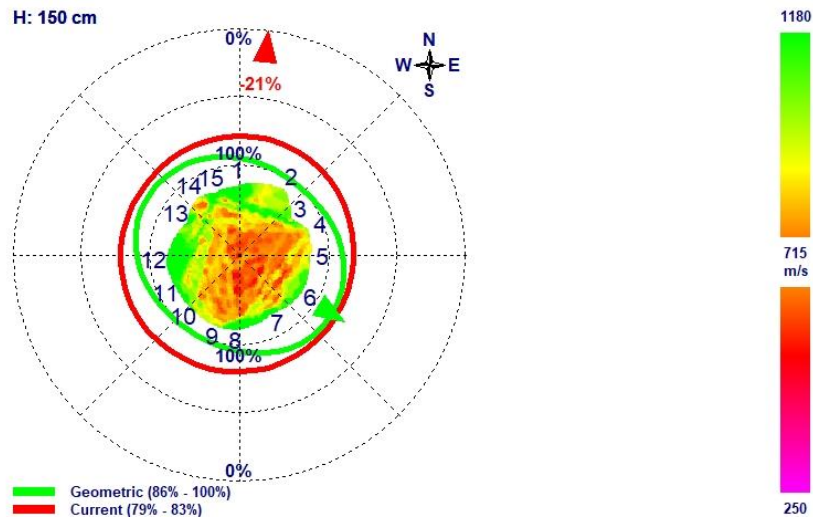


**Figure 3:** Result from Rinntech ArboTom, sonic tomography assessment. Results taken at 20 centimeters from grade and indicate that the tree has lost 38% of its load carrying capacity (strength) when forces (winds) are applied from the slightly east of north. This image is on a Green-Purple scale where hollow wood is indicated by a purple color.

Project: Cannon Tree Assessment  
Location: 1041 NE 100th St

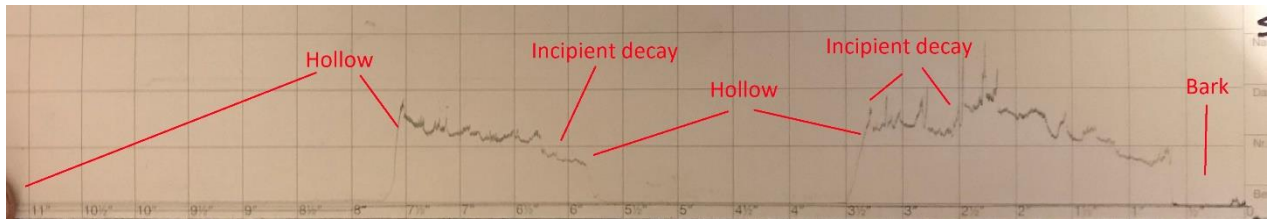
Tree: Sequoia sempervirens  
Tree species: Conifer

Date: 2/28/2020  
North: 0°

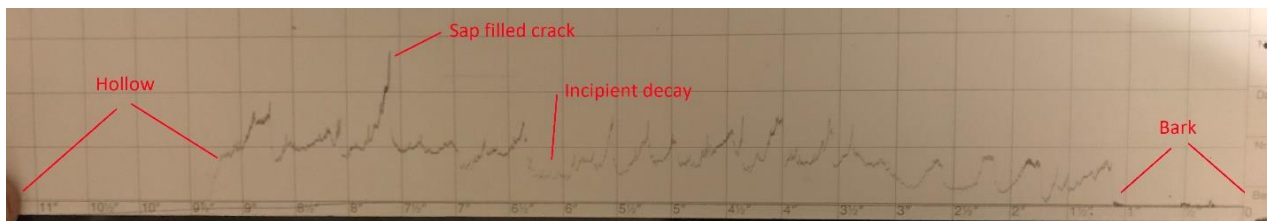


**Figure 4:** Result from Rinntech ArboTom, sonic tomography assessment. Results taken at 150 centimeters from grade and indicate that the tree has lost 21% of its load carrying capacity (strength) when forces (winds) are applied from the south. This image is on a Green-Purple scale where hollow wood is indicated by a purple color.

### ***Micro Resistance Drill Results***

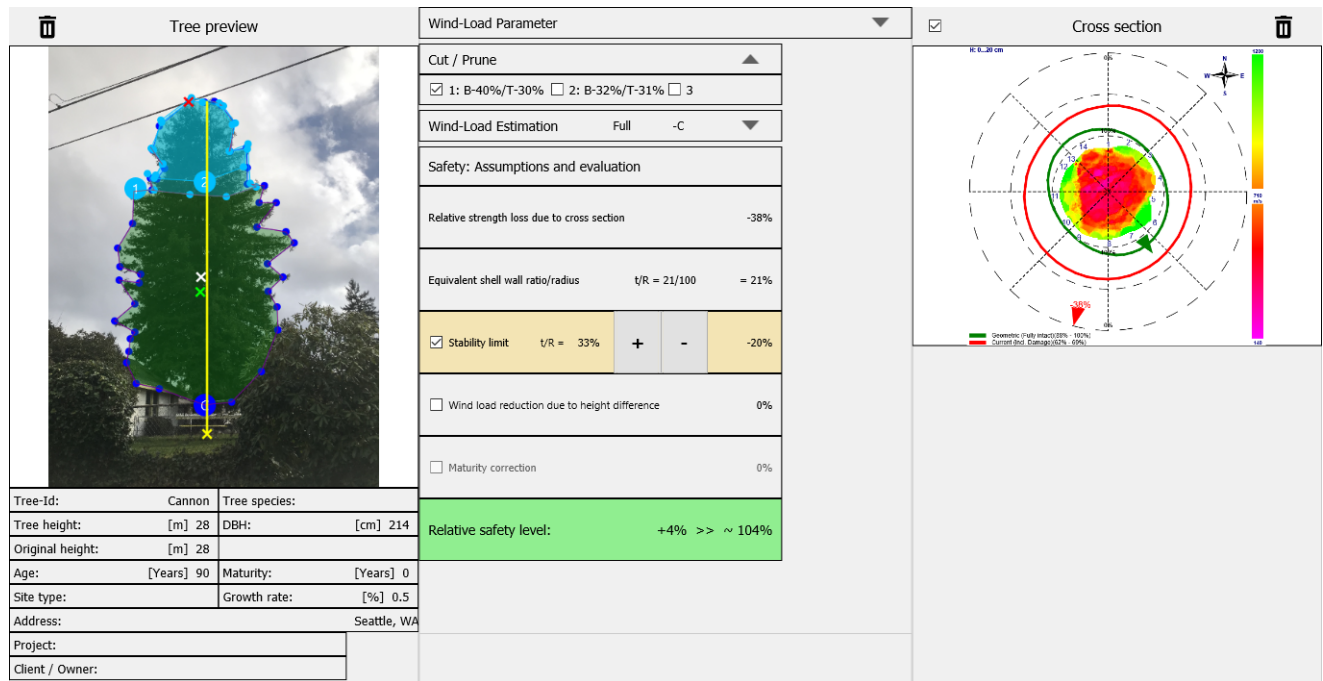


***Figure 5:*** Test taken at Sensor 6 site which was 150 centimeters high on the east side of the trunk where the burl/reaction wood is located.



***Figure 6:*** Test taken at Sensor 8 site which was 150 centimeters high on the south side of the trunk.

## ArboStApp Results



**Figure 7:** ArboStApp results consider the assessed tree species, diameter, height, age, time of maturity, growth rate, location of decayed wood in the assessed cross section of the tree and wind load. Based on these factors, this tree would have to be reduced in height by roughly 30 feet (see blue area in tree image).